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SHORTER ARTICLES AND CORRESPONDENCE

THE ENDEMIC MAMMALS OF THE BRITISH ISLANDS

WHEN, in 1891, I was collecting information to be used by Dr. A. R. Wallace in preparing the second edition of his "Island Life," I found much skepticism among naturalists concerning the alleged endemic or precinctive elements of the British fauna. Dr. Wallace was able to give lists of supposed precinctive species and varieties belonging to several groups, but for the mammals he was obliged to state, "it is the opinion of the best authorities that we possess neither a distinct species nor distinguishable variety." We little imagined that about twenty years later the British Museum would issue a work describing ten species and twenty subspecies of mammals peculiar to the British Islands; twenty-one of these being actually undescribed at the time I made my enquiries, and the rest then reposing quietly in the synonymy. Still less did we imagine that such a revision, when made, would be the work of an American, coming over from the United States National Museum to show Europeans the neglected wonders of their own fauna! The Catalogue of the Mammals of Western Europe, by Mr. G. S. Miller, published last year by the British Museum, is certainly one of the most remarkable zoological works ever produced, and is well worthy of the attention of all naturalists, whether specially interested in the Mammalia or not. While so many students of genetics are giving us the results of their experiments in breeding mammals, it is worth while to turn also to the results of nature's long-time breeding experiments, so clearly set forth by Mr. Miller in the volume cited. What, after all, is the connection between the phenomena seen by the breeder and the facts of mammalian evolution? Do species and subspecies differ by "units," and do the variations observed in captivity correspond in any way to the recorded specific and subspecific differences?

A complete analysis of Mr. Miller's volume can not be made at the present time, but I have extracted the list, given below, of the forms supposed to be confined to the British Islands, giving their distribution and principal distinctive characters. I have added to Mr. Miller's list three quite recently described animals. On examining the list, it appears that a few of the species must belong to the older fauna of the country, not wholly exterminated by the glacial ice and periods of partial submergence. Such are

Mustela hibernica of Ireland and *Microtus orcadensis* of the Orkney Islands. It is at least suggestive, in this connection, that so many of the Scottish islands yield animals differing from those of the mainland. In the majority of cases, however, the peculiar British mammals are closely related to those of the continent, and might well be of very recent origin. There is a decided tendency to darker colors, such as has been noted also among British moths. In spite of this tendency, however, some forms are lighter than their relatives, the most conspicuous case being the light-tailed British squirrel. In several cases the difference noted has in part to do with particular phases; thus the squirrel has no dark phase, and the ermine does not turn so white in winter. The British red grouse, it will be remembered, is peculiar in lacking a white winter phase. Some of these differences may be due to the direct effect of the mild and moist British climate, and would perhaps disappear in the descendants of British animals taken elsewhere. The experiments on birds by Beebe are very suggestive in this connection. In other cases, the distinctions are such as might readily result from changes in one or two ''units,'' such as are observed in experimental breeding. When we have a variable type, subject to losses and new combinations of unit characters, it is perhaps to be expected that different groups of individuals, isolated from one another, will after a time produce different homozygous combinations. That is to say, the result comes from a long series of ''accidents,'' which will probably not be duplicated in two different places. In this way mere isolation may be an adequate cause of modification, providing always that through variation degrees of heterozygosity have arisen.

In the common house mouse, *Mus musculus,* Hagedoorn[1] has isolated and figured a great number of color varieties, for nearly all of which he has constructed zygotic formulæ. Little[2] has also described and figured a similar series of varieties, apparently in ignorance of Hagedoorn's paper, which he does not cite. He gives zygotic formulæ for thirty-two different varieties, but not all of them are visibly different. Albino varieties, resulting from the dropping out of a particular determiner, may be produced, corresponding in other respects to each of the thirty-two colored forms, although they all look alike, and will only show their true characters on crossing. Several of the varieties show noteworthy fluctuating variability, due to differences in expression.

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[1] *Zeit. f. ind. Abst. Ver.,* 1912.

[2] ''Experimental Studies of the Inheritance of Color in Mice,'' 1913.

Mus musculus, then, is very conspicuously variable in color; yet Miller's book records only one subspecies, that of the Mediterranean region and the Azores, which is less dusky and more yellowish, with the under parts buffy grayish. It possibly agrees with Little's "dilute black agouti" variety. On the other hand, *M. musculus* has a recognized subspecies in Mexico, where it must have developed since the species was introduced by man. The mice of St. Kilda and the Faroe Islands, although given as distinct species, are derivatives of *Mus musculus,* differing in other points than color. In connection with subspecific differences in size, Sumner's experiments with different temperatures should be noted, since they prove that differences of temperature might lead to readily measurable differences in dimensions, wholly unconnected with losses of determiners or new zygotic combinations. Whether or not diverse conditions of this sort would ultimately affect the germ plasm, their effects would be patent long before and quite independently of any such modification. On the whole, the poverty of *Mus musculus* in subspecies would suggest that the variations observed by breeders are not, as a rule, the stuff that new subspecies are made of. Against this argument may well be adduced the fact that *M. musculus* is an urban animal, constantly traveling about, so that incipient races do not remain isolated. Here the closely related rats, *Epimys,* are worth considering. For Europe Miller can only recognize the Norway, Black and Alexandrian rats, all widespread, practically cosmopolitan. Yet in the Malay Archipelago, where *Epimys* is distributed over myriads of islands, large and small, the species are innumerable. One can almost take a map and indicate where new species of *Epimys* are to be found, namely, on those islands still unexplored. Years ago, when the writer was actively engaged in studying the British Mollusca and Lepidoptera, the question of endemic forms was constantly in mind; but in those days we failed to discriminate properly between the different classes of "varieties." We made the mistake of looking for well-marked "sports" or aberrations, rather than for constant but only slightly distinguished local races. There was a practical reason for this, in the fact that by searching the literature we could ascertain whether a well-marked variation had been reported from the continent; whereas the determination of subspecific types analogous to those described by Miller among mammals required long series from different parts of Europe, and these we did not possess, and could not readily obtain. Miller, following the custom of mammalogists, lays great stress on subspecies, but almost ignores individual variations, except such as are expressed by the statistical data regarding size. By reading the synonymy, one can see that many such variations have received names, and I can not doubt that the time will come when these names will be generally used. In this case, it will be extremely desirable to use the same adjectival name for analogous varieties of different species, and beyond the limits of subspecies it ought not to be held that a name once used in a genus can not be employed again. It may be true that most or all of the "individual" varieties can be expressed by zygotic formulæ, but one can not remember all these formulæ, nor use them in speech with any comfort. Moreover, they have to do with the germinal constitution rather than the patent characters. Little provides all his varieties with polynomial English appellations, but would not Latin varietal names be better? Following his theory concerning the pigments, some of the varieties receive names which do not suggest the animals at all; thus "brown-eyed yellow," according to the apparently excellent colored plate, is light orange-ferruginous, while "sooty-yellow" is dark gray with yellowish under parts. Morgan[3] describes a wild variety of *M. musculus* from Colorado, which he calls "mauve," but from the detailed account it is rather "fauve," namely, fulvous or yellowish brown. It must be similar to the Old World subspecies *azoricus*, or possibly that subspecies introduced? If we had standard scientific names for the different forms, we should try to compare our specimens with the types or descriptions of those names, and it would not be left to authors to use such miscellaneous descriptive terms as might occur to them. For *Mus musculus*, possibly Little's apparently excellent colored plates might be made the standards for a series of names. Thus his Fig. 9 (pl. 3) is the animal named *niger* as long ago as 1801; Fig. 10, the dilute black, would naturally take the name *nigrescens*. Fig. 12 is probably *albicans* of Billberg, 1827.

MAMMALS PECULIAR TO THE BRITISH ISLANDS

Insectivora

Sorex araneus castaneus (Jenyns 1838). Great Britain. Not so dark as true *araneus*.

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[3] *Ann. N. Y. Acad. Sci.*, XXI, p. 106.

Sorex granti (Barrett-Hamilton and Hinton 1913). Inner Hebrides. Differs from *araneus* by the contrast between bright-colored flanks and dusky upper parts; teeth also different.

Neomys fodiens bicolor (Shaw 1791). Great Britain. Under parts usually washed with wood-brown instead of buffy whitish; skull smaller.

Chiroptera

Rhinolophus ferrum-equinum insulanus Barrett-Hamilton 1910. Central and S. England. Wing shorter.

Rhinolophus hipposideros minutus (Montagu 1808). England and Ireland. Wing shorter.

Carnivora

Mustela erminea stabilis (Barrett-Hamilton 1904). Mainland of Great Britain. Rather large, with large teeth; color somewhat different, a little darker above. Change to white in winter less complete and regular than in continental forms.

Mustela erminea ricinæ (Miller 1907). Islands of Islay and Jura, Scotland. Smaller than *stabilis;* proportions of skull different.

Mustela hibernica (Thomas and Barrett-Hamilton 1895). Ireland and Isle of Man. Quite distinct; recognized by combination of black-tipped, heavily penciled tail with entirely dark ear and upper lip. Superficially like certain North American forms.

Felis sylvestris grampia (Miller 1907). Scotland; formerly throughout Great Britain. Darker, with more pronounced black markings.

Rodentia

Lepus europæus occidentalis de Winton 1898. England, Scotland and Isle of Man. Buffy tints rich and dark.

Lepus timidus scoticus (Hilzheimer 1906). Highlands of Scotland. Smaller; rarely becomes so white in winter as Alpine race.

Lepus hibernicus Bell 1837. Ireland. Distinguished by the strongly russet color and partial or complete absence of white winter coat. Larger than *scoticus.*

Evotomys alstoni Barrett-Hamilton and Hinton 1913. Island of Mull, Hebrides.

Evotomys glareolus britannicus (Miller 1900). Great Britain. Smaller; color less intense.

Evotomys skomerensis Barrett-Hamilton 1903. Skomer Island, off coast of Wales. Color above unusually light and bright; skull peculiar.

Microtus agrestis exsul Miller 1908. North and South Uist, Hebrides. Resembles true *agrestis* of Scandinavia; teeth peculiar, a character usually present which elsewhere in the species occurs as a rather rare anomaly.

Microtus agrestis macgillivraii Barrett-Hamilton and Hinton 1913. Island of Islay, Hebrides.

Microtus agrestis hirtus (Bellamy 1839). England and South Scotland. Smaller than typical *agrestis;* upper parts noticeably tinged with russet, and venter washed with wood-brown.

Microtus agrestis neglectus (Jenyns 1841). Highlands of Scotland. Not so small as *hirtus;* upper parts darker.

Microtus orcadensis Millais 1904. South Orkney Islands. Related to *M. sarnius* of Guernsey and the Pleistocene *M. corneri* of South England. Distinguished by its large size and dark color.

Microtus sandayensis (Millais 1905). Sanday Island, N. Orkney group. Allied to *orcadensis,* but skull differing; upper parts much lighter.

Microtus sandayensis westræ Miller 1908. Westray Island, N. Orkney group. Not so pale as in typical form; teeth differing a little.

Arvicola amphibius (L. 1758). Typical subspecies. England and South Scotland. Large; color moderately dark.

Arvicola amphibius ater (Macgillivray 1832) = *reta* Miller 1910. Scotland, except southward. Darker, melanism frequent. The name was changed on account of *Hypudæus terrestris* var. *ater* Billberg 1827, but the change is perhaps needless, as Billberg's animal was not a subspecies, and has not been treated as a species or subspecies under *Arvicola.*

Apodemus hebridensis (de Winton 1895). Lewis and Barra islands, Hebrides. Large, with small ears; color dark.

Apodemus hirtensis (Barrett-Hamilton 1899). Island of St. Kilda. Near *hebridensis,* but skull larger and color darker.

Apodemus fridariensis (Kinnear 1906). Fair Isle, Shetland group. Large; skull peculiar; colors also somewhat peculiar.

Apodemus flavicollis wintoni (Barrett-Hamilton 1900). England. Under parts with duller color, pectoral spot more diffuse.

Mus muralis Barrett-Hamilton 1899. Island of St. Kilda. Like *M. musculus* but feet and tail less slender; skull peculiar.

Mus fœroensis (Clarke 1904). Faroe Islands. Larger than *musculus* and *muralis;* hind foot very robust; tail thickened.

Sciurus vulgaris leucourus Kerr 1792. Great Britain and Ireland. Small; tail drab, fading in summer to cream buff. No dark phase.

Ungulata

Cervus elaphus scoticus Lönnberg 1906. Great Britain. Color darker and less gray than in the related Norwegian form.

Capreolus capreolus thotti Lönnberg 1910. Great Britain. Darker, face darker than body.

I thought it of interest to compare the above British list with a similar one for the Spanish peninsula (Spain and Portugal). The latter area is continuous northward with France, but the Pyrenees constitute a barrier. The Iberian peninsula differs so much in its recent geological history from Britain, and is at the same time so much more southern, that we should expect to find the faunal elements very different. This expectation is realized, yet the difference in numbers between the two lists is not very great, and the number of Iberian forms treated as distinct *species* is exactly the same (12) as that for the British Islands. This suprising result is evidently due to the numerous small islands of the British group, such islands being wanting around the coasts of Spain.

MAMMALS PECULIAR TO THE SPANISH (IBERIAN) PENINSULA

Insectivora

Talpa occidentalis (Cabr.).
Galemys pyrenaicus rufulus (Graells.).
Sorex araneus granarius Miller.
Neomys anomalus Cabr.
Crocidura mimula cantabra (Cabr.).
Crocidura russula cintræ Miller.
Erinaceus europæus hispanicus B.-Ham.

Chiroptera

(None.)

Carnivora

Canis lupus signatus Cabr.
Canis lupus deitanus Cabr.
Meles meles marianensis (Graells.).
Martes foina mediterranea (B.-Ham.).
Mustela nivalis iberica (B.-Ham.). (Also Balearic Is.).
Mustela putorius aureolus (B.-Ham.).
Mungos widdringtonii (Gray).
Genetta genetta (L.), typical subsp.
Felis sylvestris tartessia (Miller).
Lynx pardellus Miller.

Rodentia

Lepus granatensis Rosenb. (Also Balearic Is.).
Lepus granatensis gallæcius Miller.
Eliomys lusitanicus (Reuvens).
Glis glis pyrenaicus Cabr.
Microtus agrestis rozianus (Bocage).
Microtus asturianus Miller.
Arvicola sapidus Miller, typical subsp.
Pitymys lusitanicus (Gerbe).
Pitymys mariæ (Major).
Pitymys pelandonius Miller.
Pitymys depressus Miller.
Pitymys ibericus (Gerbe), typical subsp.
Pitymys ibericus centralis Miller.
Pitymys ibericus pascuus Miller.
Pitymys ibericus regulus Miller.
Mus spicilegus hispanicus Miller.
Mus spicilegus hispanicus Miller.
Sciurus vulgaris numantius Miller.
Sciurus vulgaris infuscatus (Cabr.).
Sciurus vulgaris seguræ Miller.
Sciurus vulgaris bæticus (Cabr.).

Ungulata

Sus scrofa castilianus Thomas.
Sus scrofa bæticus Thomas.
Cervus elaphus hispanicus Hilzh.
Capreolus capreolus canus Miller.
Capra pyrenaica lusitanica (França).
Capra pyrenaica victoriæ Cabr.
Capra pyrenaica hispanica (Schimp.).
Rupicapra parva (Cabr.).

T. D. A. COCKERELL

UNIVERSITY OF COLORADO

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